

Corporate Real Estate Ownership Implications

Citation for published version (APA):

Eichholtz, P. M. A., & Brounen, D. (2005). Corporate Real Estate Ownership Implications: International Performance Evidence. *Journal of Real Estate Finance and Economics*, 30(4), 429–445.
<https://doi.org/10.1007/s11146-005-7015-5>

Document status and date:
Published: 01/01/2005

DOI:
[10.1007/s11146-005-7015-5](https://doi.org/10.1007/s11146-005-7015-5)

Document Version:
Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.umlib.nl/taverne-license

Take down policy

If you believe that this document breaches copyright please contact us at:

repository@maastrichtuniversity.nl

providing details and we will investigate your claim.



Corporate Real Estate Ownership Implications: International Performance Evidence

DIRK BROUNEN

Erasmus University Rotterdam, P.O. Box 1738, 3000 DR, Rotterdam, The Netherlands
E-mail: dbrounen@fbk.eur.nl

PIET M. A. EICHHOLTZ

University of Maastricht, P.O. Box 616, 6200 MD, Maastricht, The Netherlands

Abstract

In this paper we explore corporate real estate ownership internationally. Based on a sample of 4,636 companies from 18 industries and 9 countries we document distinct patterns and trends in the corporate ownership level of real estate. Real estate ownership appears to be driven by industrial rather than national differences, with corporate real estate ratios ranging between 0.13 for Business Services and 0.63 for the Mining sector. Overall, real estate ownership appears to be decreasing over time, which may be due to the gaining popularity of lease alternatives. When analyzing the stock performance of the companies in our sample, we discover a significantly negative relationship between real estate ownership and a firm's systematic risk. Idiosyncratic risk bears no significant relationship with real estate ownership. With respect to stock returns our results show that returns are lowest among firms with the highest real estate ownership levels in each industry. After controlling for the variation in risks, the remaining return patterns differ strongly across industries, with a significantly negative relationship between stock outperformance and real estate ownership for Communications and Business Services and a positive but not significant relationship for Transportation.

Key Words: corporate real estate, firm performance, systematic risk

1. Introduction

Corporate real estate forms one of the largest asset classes in the world. The value of European corporate real estate has been estimated to exceed the total European institutional real estate investment portfolio. For example, Krumm and Linneman (2001) estimated the value of Dutch corporate real estate holdings to be approximately 220 billion, whereas the real estate portfolios of Dutch institutional investors amount to less than a third of this value. According to these authors one of the prime reasons for the magnitude of these corporate portfolios has been the absence of well-developed commercial real estate markets. For most of the last century European companies had no choice but to own their land and buildings. Indeed, according to a recent study by DTZ (2003) approximately 70% of European businesses are owner-occupiers. In contrast, the equivalent figure for US firms is only 30%. The same report estimates the total value of corporate real estate in Germany, France and the United Kingdom at approximately 1,000 billion, 700 billion and 710 billion, respectively. By comparison, IPD (2003a–c)

estimates the total combined market capitalization of the institutional property portfolio in these countries at 117 billion, 92 billion and 226 billion, respectively.¹

The magnitude of corporate real estate assets is such that the costs associated with owning these properties have become second only to payroll costs in many organizations (Veale, 1989). Despite that, and despite the fact that real estate accounts for 25 to 40 percent of the total assets of large firms (Zeckhauser and Silverman, 1983), it is generally not very important to corporate management. Corporate real estate has commonly been seen as a necessary evil, which requires the commitment of large capital spending for relatively long periods of time. Companies typically build up a real estate portfolio to meet the needs of their principal business activities and after acquiring their properties most firms spend little time evaluating them.

In a survey of more than seven hundred executives of large US firms, Arthur Anderson & Company (1993) reported that the vast majority of the respondents did not feel a need to link strategic real estate planning and business planning. Very few companies produced recurring reports on the performance and value of their real estate assets, suggesting that real estate was still not managed efficiently in the early nineties. The only market actors appearing to be interested in this inefficiency were corporate raiders. Ambrose (1990) reported on the role of real estate in the takeover market. He documented that corporate real estate holdings increased the likelihood of a firm becoming a takeover candidate. Apparently raiders were aware of the hidden values available through the restructuring of badly managed corporate real estate assets.

In the last decade, however, executives seem to have been rediscovering their property assets and have looked at them more critically. As a result, more and more firms have opted for corporate leases, which decrease the capital burden and enhance corporate flexibility. Manning (1991) discussed the buy versus lease dilemma and has reported a trend towards leasing.

The effects of these decisions on the risk and return to stockholders have been studied only sporadically.² Glascock et al. (1989, 1991) and Myer et al. (1992) have used standard event study methodology to analyze market reactions to the announcements of corporate real estate divestitures. Both studies find a positive abnormal return, which suggests that stockholders appear to benefit when companies sell their properties. By the same token Slovin et al. (1990) and Rutherford (1990) document positive price reactions to the announcement of sale-leasebacks of real estate. These event studies all indicate that stockholders appreciate management efforts to restructure their business real estate. However, this does not simultaneously imply that real estate ownership harms a firm's stock performance in general. These studies analyze specific events in which management has stepped in, in order to improve their businesses. These events may be preceded by situations in which inefficiencies were extremely high and may therefore not relate to real estate ownership in the usual course of events, but more to signals of a change in general management quality. On the other hand, these studies do support a trend towards corporate leases, which can stimulate real estate securitization. Companies that sell their real estate holdings will need an alternative such as a lease contract. This will increase the demand for commercial real estate leases, supplied by institutional investors and specialized real estate companies.

Although the advantages of such flexible lease strategies are apparent, empirical evidence on the matching financial gains is scant. The only papers that have looked at the relationship between corporate real estate ownership and firm performance have so far been Deng and Gyourko (1999) and Seiler et al. (2001). They have looked into this matter for the United States market and document a negative relationship between real estate ownership and a firm's beta, but they find no significant relationship with firm outperformance. Following their example, we will examine corporate real estate holdings and the performance of non-real estate companies.

This paper explores the extent to which corporate real estate holdings vary across industries in an international context and whether and how these holdings affect the stock performance of non-real estate companies. First, we will analyze a broad data sample of firms active in 18 different industries based in 9 countries around the world: Australia, Hong Kong, Japan, France, Germany, the Netherlands, the United Kingdom, Canada and the United States. By comparing corporate real estate ownership levels in these countries we can find out whether structural variations in these ownership levels exist internationally. The second portion of this study will focus on the risk-return profiles of the firms in the sample in order to investigate the nature of the relationship between real estate ownership and firm performance. We will use a two stage least squares methodology to investigate the performance effects of corporate real estate holdings.

The remainder of this paper is organized as follows. In the next section we will present information regarding the data sample we use in the analysis. Section 3 discusses the methodology that will be applied, while Section 4 presents the empirical results. Finally, the paper ends with summarizing conclusions.

2. Data description

For this study we gathered stock performance, dividend, and balance sheet information for 4,636 companies from the Compustat tapes provided by Standard and Poor's. We did that for 1992, 1995, 1998 and 2000. The sample includes firms based in Australia, Hong Kong, Japan, France, Germany, the Netherlands, the United Kingdom, Canada, and the United States.³ All firms were categorized into 18 industrial sectors using two-digit SIC classifications.⁴

The statistics regarding the sample breakdown are presented in Table 1, which reports the sample distributions across countries and industries by number of firms. The table shows that the number of firms in certain categories, like Personal Services and Agriculture, is rather small, indicating that one has to be careful when interpreting the empirical results for these sectors.

For each firm we collected information concerning the following variables: country of origin, industry classification, total stock return, market capitalization, leverage, book value of assets, and book value of 'Property, Plant and Equipment' (PPE). Leverage is computed as the ratio of total debt and the product of common shares outstanding and

Table 1. Sample distribution by number of companies.

<i>SIC-Codes</i>	<i>AU</i>	<i>CA</i>	<i>FR</i>	<i>GR</i>	<i>HK</i>	<i>JP</i>	<i>NL</i>	<i>UK</i>	<i>US</i>	<i>Total</i>	<i>%</i>
0100–0299 Agriculture	1	1	8	0	0	4	0	7	8	29	1
1000–1499 Mining	74	98	7	3	0	10	0	27	99	318	7
2000–2199 Food and tobacco	16	18	31	25	5	146	9	33	67	350	8
2200–2299 Textile	0	0	12	9	5	58	3	15	22	124	3
2700–2799 Publishing	7	9	3	6	3	28	6	25	45	132	3
2800–2899 Chemicals	15	36	24	32	4	227	4	39	247	628	14
2900–2999 Petroleum	3	6	4	2	1	11	2	3	16	48	1
3600–3699 Electronics	8	29	28	41	12	235	5	48	270	676	15
4400–4599 Transportation	3	8	5	4	7	36	4	16	34	117	3
4800–4899 Communication	17	26	16	14	22	7	18	7	132	259	6
4900–4999 Utilities	6	14	9	23	4	22	0	25	135	238	5
5800–5899 Restaurants	0	1	5	0	3	61	0	18	39	127	3
5400–5499 Food-stores	2	5	6	3	0	69	2	11	21	119	3
7000–7099 Hotels	5	3	10	2	5	12	0	11	13	61	1
7200–7299 Personal services	1	0	1	0	0	6	0	4	9	21	0
7300–7399 Business services	31	40	109	126	0	172	27	149	455	1,109	24
8000–8099 Health care	6	4	4	7	0	3	0	4	47	75	2
8700–9799 Business advisory	10	6	26	14	0	46	6	39	58	205	4
Total	205	304	308	311	71	1,153	86	481	1,717	4,636	
% of sum total	4%	7%	7%	7%	2%	25%	2%	10%	37%		

share price. To quantify relative real estate ownership we constructed a corporate real estate ratio (CRER), which divides Compustat's (PPE) variable⁵ by the book value of a firm's total assets:⁶

$$CRER = \frac{PPE}{Total\ Assets} \quad (1)$$

Besides the firm-specific data, we also need general stock market indices and risk-free rates of return in order to determine systematic risk and outperformance of the companies in the sample. To enable international comparison of results, we have selected the Morgan Stanley Capital International (MSCI) Indices as stock market proxies. One-month government bill rates serve as the risk-free rate of return. Everything was done in local currencies, and on a monthly frequency.

Table 2 reports the aggregated results for corporate real estate ownership. The observed CRER-values clearly illustrate that the deviation in national means regarding the same industry is relatively low and insignificant. But when comparing real estate holdings across industries the results exhibit very large differences, with CRER-values in

Table 2. Corporate real estate ownership ratios by industry, country, and year.

	<i>AU</i>	<i>CA</i>	<i>FR</i>	<i>GR</i>	<i>HK</i>	<i>JP</i>	<i>NL</i>	<i>UK</i>	<i>US</i>	<i>Total</i>	<i>stdev</i>
<i>All sectors</i>											
1992	0.43	0.43	0.17	0.29	0.25	0.30	0.36	0.40	0.32	0.34	0.26
1995	0.38	0.44	0.19	0.29	0.28	0.30	0.31	0.37	0.31	0.33	0.24
1998	0.38	0.44	0.18	0.20	0.40	0.32	0.28	0.33	0.29	0.32	0.24
2000	0.35	0.41	0.18	0.17	0.30	0.31	0.22	0.29	0.26	0.29	0.22
<i>Agriculture</i>											
1992	—	0.62	0.18	—	—	0.27	—	0.30	0.56	0.43	0.23
1995	0.30	0.28	0.16	—	—	0.47	—	0.35	0.55	0.41	0.22
1998	0.41	0.19	0.18	—	—	0.50	—	0.49	0.49	0.39	0.24
2000	0.46	0.21	0.17	—	—	0.49	—	0.54	0.49	0.41	0.25
<i>Mining</i>											
1992	0.52	0.68	0.40	0.42	—	0.33	—	0.67	0.66	0.63	0.21
1995	0.53	0.72	0.28	0.27	—	0.33	0.65	0.68	0.69	0.64	0.23
1998	0.58	0.77	0.32	0.34	—	0.36	0.72	0.48	0.71	0.66	0.25
2000	0.55	0.74	0.40	0.34	—	0.34	0.65	0.49	0.69	0.63	0.23
<i>Food and tobacco</i>											
1992	0.37	0.29	0.22	0.39	0.53	0.35	0.47	0.49	0.36	0.37	0.15
1995	0.37	0.32	0.21	0.37	0.54	0.38	0.38	0.45	0.37	0.37	0.16
1998	0.40	0.33	0.21	0.37	0.45	0.40	0.35	0.51	0.36	0.38	0.17
2000	0.41	0.34	0.24	0.35	0.43	0.39	0.30	0.48	0.37	0.38	0.16
<i>Textile</i>											
1992	—	—	0.27	0.43	0.48	0.28	0.29	0.37	0.39	0.33	0.11
1995	—	—	0.20	0.32	0.26	0.30	0.38	0.36	0.40	0.32	0.12
1998	—	—	0.23	0.30	0.27	0.33	0.33	0.40	0.39	0.34	0.14
2000	—	—	0.23	0.29	0.24	0.37	0.32	0.35	0.36	0.34	0.15
<i>Publishing</i>											
1992	0.25	0.41	0.23	0.16	0.45	0.33	0.43	0.32	0.30	0.32	0.18
1995	0.28	0.35	0.23	0.16	0.76	0.33	0.36	0.30	0.27	0.31	0.17
1998	0.25	0.34	0.29	0.24	0.68	0.37	0.26	0.22	0.23	0.28	0.19
2000	0.23	0.24	0.21	0.20	0.38	0.32	0.22	0.19	0.20	0.24	0.17
<i>Chemicals</i>											
1992	0.33	0.32	0.28	0.31	—	0.30	0.46	0.38	0.28	0.30	0.15
1995	0.38	0.28	0.24	0.31	0.52	0.30	0.45	0.34	0.28	0.29	0.15
1998	0.34	0.28	0.22	0.27	0.36	0.33	0.50	0.30	0.26	0.29	0.16
2000	0.29	0.28	0.21	0.26	0.32	0.32	0.45	0.26	0.22	0.27	0.16
<i>Petroleum</i>											
1992	0.73	0.73	0.31	0.09	—	0.32	0.60	0.49	0.61	0.50	0.22
1995	0.45	0.70	0.28	0.22	—	0.36	0.59	0.44	0.62	0.49	0.23
1998	0.72	0.76	0.29	0.25	—	0.36	0.43	0.45	0.61	0.51	0.22
2000	0.58	0.71	0.26	0.40	—	0.36	0.32	0.40	0.53	0.47	0.19
<i>Electronics</i>											
1992	—	0.22	0.21	0.29	0.29	0.27	0.30	0.31	0.24	0.26	0.12
1995	—	0.21	0.24	0.26	0.28	0.26	0.27	0.28	0.23	0.24	0.12
1998	0.18	0.20	0.20	0.23	0.24	0.27	0.30	0.25	0.23	0.24	0.13
2000	0.21	0.19	0.18	0.22	0.21	0.26	0.29	0.21	0.18	0.22	0.13
<i>Transportation</i>											
1992	0.53	0.62	0.29	0.66	0.42	0.51	0.63	0.48	0.61	0.55	0.20
1995	0.57	0.54	0.18	0.59	0.38	0.50	0.59	0.51	0.56	0.52	0.20
1998	0.41	0.47	0.28	0.65	0.43	0.53	0.45	0.58	0.59	0.53	0.21
2000	0.37	0.39	0.29	0.55	0.35	0.54	0.42	0.59	0.57	0.52	0.23

Table 2. Continued.

	<i>AU</i>	<i>CA</i>	<i>FR</i>	<i>GR</i>	<i>HK</i>	<i>JP</i>	<i>NL</i>	<i>UK</i>	<i>US</i>	<i>Total</i>	<i>stdev</i>
<i>Communication</i>											
1992	0.32	0.46	0.29	0.24	—	0.52	0.83	0.40	0.43	0.43	0.25
1995	0.36	0.48	0.25	0.46	—	0.53	0.68	0.34	0.37	0.40	0.24
1998	0.24	0.43	0.14	0.18	0.56	0.50	0.61	0.35	0.34	0.35	0.23
2000	0.24	0.42	0.13	0.13	0.37	0.36	0.42	0.23	0.36	0.32	0.22
<i>Utilities</i>											
1992	0.57	0.72	0.13	0.53	0.84	0.78	—	0.74	0.74	0.71	0.19
1995	0.52	0.73	0.41	0.53	0.75	0.77	—	0.77	0.71	0.70	0.18
1998	0.55	0.75	0.41	0.43	0.67	0.78	—	0.72	0.62	0.63	0.22
2000	0.51	0.69	0.40	0.39	0.55	0.74	—	0.65	0.55	0.57	0.22
<i>Restaurants</i>											
1992	—	0.45	0.05	—	—	0.40	—	0.85	0.61	0.53	0.22
1995	—	0.44	0.06	—	0.35	0.39	—	0.84	0.72	0.56	0.24
1998	—	0.45	0.36	—	0.32	0.41	—	0.81	0.72	0.57	0.24
2000	—	0.53	0.41	—	0.29	0.43	—	0.78	0.73	0.56	0.23
<i>Foodstores</i>											
1992	0.49	0.51	0.31	—	—	0.39	0.43	0.73	0.44	0.44	0.17
1995	0.40	0.52	0.36	—	—	0.43	0.45	0.64	0.51	0.47	0.17
1998	0.43	0.40	0.37	0.52	—	0.45	0.47	0.65	0.53	0.48	0.16
2000	0.41	0.39	0.36	0.47	—	0.46	0.47	0.66	0.52	0.48	0.17
<i>Hotels</i>											
1992	0.98	0.49	0.46	0.10	0.82	0.56	—	0.79	0.45	0.58	0.28
1995	0.93	0.44	0.45	0.39	0.80	0.61	—	0.81	0.50	0.61	0.26
1998	0.52	0.60	0.40	0.51	0.73	0.59	—	0.85	0.76	0.65	0.26
2000	0.51	0.42	0.44	0.33	0.55	0.64	—	0.83	0.71	0.62	0.26
<i>Personal services</i>											
1992	0.30	—	—	—	—	0.46	—	0.52	0.34	0.40	0.14
1995	0.29	—	—	—	—	0.49	—	0.51	0.34	0.40	0.15
1998	0.24	—	0.02	—	—	0.46	—	0.71	0.27	0.40	0.22
2000	0.09	—	0.01	—	—	0.47	—	0.61	0.25	0.35	0.22
<i>Business services</i>											
1992	0.65	0.18	0.11	0.32	—	0.26	0.16	0.34	0.19	0.23	0.19
1995	0.29	0.21	0.10	0.31	—	0.28	0.11	0.29	0.18	0.21	0.18
1998	0.21	0.17	0.09	0.14	0.12	0.27	0.11	0.19	0.15	0.16	0.16
2000	0.12	0.11	0.07	0.09	0.04	0.23	0.13	0.14	0.13	0.13	0.15
<i>Healthcare</i>											
1992	0.28	0.20	—	0.66	—	0.24	—	0.51	0.37	0.36	0.21
1995	0.31	0.44	—	0.73	—	0.30	—	0.43	0.30	0.33	0.21
1998	0.37	0.28	0.16	0.51	—	0.31	—	0.58	0.27	0.31	0.24
2000	0.36	0.26	0.25	0.50	—	0.34	—	0.48	0.28	0.32	0.24
<i>Business advisory</i>											
1992	0.31	0.29	0.01	0.27	—	0.20	0.24	0.29	0.20	0.22	0.14
1995	0.27	0.18	0.22	0.25	—	0.23	0.22	0.23	0.16	0.20	0.14
1998	0.26	0.15	0.12	0.14	—	0.25	0.25	0.16	0.16	0.18	0.15
2000	0.20	0.18	0.11	0.14	—	0.27	0.13	0.14	0.11	0.16	0.14

the year 2000 ranging from 0.13 for Business Services to 0.63 for the Mining sector. However, one has to be careful when comparing these ratios across industries: the ratio does not only include property, but also plant and equipment, and it is quite likely that at least a part of the high ratio for categories like Mining, Utilities, and Petroleum can be attributed to plant and equipment, rather than property.

Judging from Table 2 one may conclude that companies in the Business Services and Business Advisory sectors have little need to own the buildings in which they operate. One obvious explanation is the type of real estate that is needed by these companies: they mainly use office space, for which a great supply of leasable space is offered internationally. Moreover, the office is not likely to be a strategic asset. On the other hand, companies which are active in heavy industries like Utilities, Mining and Petroleum are forced to own a large part of the real estate assets they use, since the industrial real estate they need is often tailor-made and therefore not suited for standardized lease contracts. For example, if Shell desires to expand its business in France it will need to build its own industrial complexes, since the supply of suitable lease plants is low or non-existent. Besides high ratios for industrial sectors, we also document high levels of real estate ownership within the Hotel, Restaurant and Foodstore businesses, which may be explained by the fact that real estate assets represent a vital and strategic asset in these sectors, with the exact nature and location of the real estate being of very high importance for the success of these companies.

Across countries, the variation in relative real estate holdings is less distinct. Germany and France have the lowest average ratios of 0.17 and 0.18, respectively, while the Canadian and Australian firms in the sample have respective average CRERs of 0.41 and 0.35. However, this is mainly due to the predominance of the Mining sector in these countries, and does not imply that other companies own relatively large amounts of property as well.

Regarding the time variance in the CRER-observations the results support earlier studies claiming a trend towards leasing. When comparing the change in the aggregated industry means over time we document a distinctly decreasing trend for 11 out of 18 industries, whereas only Hotels, Foodstores and Restaurants—all retail-oriented sectors—appear to be increasing their real estate ownership levels. The decreasing trend was most distinct for Business Services, which exhibits a gradual decrease in CRER from 0.23 to 0.13 over the sample period, a decrease that can be observed in each single national subsample. Aggregating the individual CRER-observations of all 18 industries results in a general CRER for the overall economy. This overall CRER decreases steadily from 0.34 (1992), 0.33 (1995), 0.32 (1998) to 0.29 (2000) and an F-statistic of 69.25 clearly illustrates that the difference between these annual averages are significant.⁷ It is important to note that part of this downward trend in real estate ownership is only visible due to the 'traditional' accounting standards, in which lease assets and liabilities are not shown on the balance sheet. The new IFRS standards will do so explicitly, which will make it hard to look at these real estate ownership trends in the future: the worldwide adoption of these standards will create a structural break in the CRER observations. To conclude, corporate real estate ownership is decreasing over time, varies significantly across industries, and varies less strongly across countries.

3. Methodology

Having quantified and examined real estate ownership internationally, it is time to turn to the second portion of this paper, in which we analyze the firms' stock performances. We will link these results to the previously reported real asset ownership structures. The stock performance is analyzed using a single index model, which quantifies both the historic return and risk characteristics, using the following standard equation:

$$R_{i,t} - R_{f,t} = \alpha_{i,t} + \beta_{i,t}(R_{m,t} - R_{f,t}) + \varepsilon_{i,t} \quad (2)$$

in which $R_{i,t}$ denotes the total stock return of firm i , over period t , $R_{f,t}$ represents the risk-free rate of return over period t , $R_{m,t}$ is the national market return over period t , $\beta_{i,t}$ denotes systematic risk and quantifies the sensitivity of a stock of firm i to movements in the national stock market occurring in period t , and $\alpha_{i,t}$ is Jensen's alpha, which denotes the difference between the mean total return earned by a stock and the equilibrium return that should have been earned by the stock given the market conditions and its systematic risk. In other words, Jensen's alpha is the intercept in the regression of stock excess returns on the market excess returns.

Due to real estate's low systematic risk (beta), we might expect firms with relatively high real estate holdings to be associated with lower betas compared to their peers. On the other hand we may also reason that firms with relatively low betas to start with will have low cost of capital and therefore will be capable of acquiring real estate at a more competitive price. Low risk firms will therefore be more likely to end up with relatively high corporate real estate ownership levels. This creates a situation in which simultaneous relationships can be at work. To analyze the relationship between corporate real estate ownership and stock performance we will therefore use a two-stage least squares procedure⁸ by calibrating the following model for explaining both the cross-sectional variations in systematic risk and the Jensen alpha:

$$\begin{aligned} \beta_{i,t} = & \gamma_0 + \gamma_1 \hat{CRER}_{i,t} + \gamma_2 \text{Leverage}_i + \gamma_3 \ln \text{Size}_i + \sum_{i=1}^8 \gamma_i CD_i \\ & + \sum_{j=1}^{17} \gamma_j ID_j + \eta_{i,t} \end{aligned} \quad (3)$$

$$\begin{aligned} \alpha_{i,t} = & \gamma_0 + \gamma_1 \hat{CRER}_{i,t} + \gamma_2 \text{Leverage}_i + \gamma_3 \ln \text{Size}_i + \sum_{i=1}^8 \gamma_i CD_i \\ & + \sum_{j=1}^{17} \gamma_j ID_j + \eta_{i,t} \end{aligned} \quad (4)$$

The equations relate a firm's equity beta,⁹ and Jensen alpha to the corresponding predicted corporate real estate ratio (\hat{CRER}), firm leverage, company size and includes both country (CD_i) and industry dummies (ID_j) to control for the differences that exist across

countries and industries. Instead of using the observed CRERs this model uses a predicted CRER from a reduced form equation, with the lagged CRER, company size, firm leverage, and a poor performance dummy¹⁰ as instrumental variables.

4. Empirical results

Given the vast size of the sample and analysis we present the results of the analysis in separate subsections. First we present and discuss the stock performance characteristics resulting from the single index model. We continue by studying the relationship between these risk and return measures and the corresponding real estate ownership ratios.

4.1. Stock performance

By relating the historic excess stock return of each firm to the movements of the corresponding national index we gather insights in the risk and return profile of each individual firm. Table 3 summarizes the main outcomes of this single index analysis. The results regarding industry beta exhibit a strong variation across the different industries with the highest systematic risk for firms in the Electronics and Communication (high-tech) industries. At the other end of the spectrum we find industries like Agriculture,

Table 3. Industrial beta and return statistics, 1997–2000.

	<i>AU</i>	<i>CA</i>	<i>FR</i>	<i>GR</i>	<i>HK</i>	<i>JP</i>	<i>NL</i>	<i>UK</i>	<i>US</i>	<i>Avg. beta</i>	<i>Avg. return</i>
Agriculture	0.31	0.10	0.07	–	–	0.68	–	0.41	0.25	0.32	–2.80%
Mining	0.84	0.26	0.15	0.11	–	0.58	–	0.33	0.72	0.54	4.49%
Food and tobacco	0.65	–	0.21	0.16	0.60	0.56	0.55	0.21	0.51	0.45	–1.23%
Textile	–	–	0.01	0.20	0.47	0.73	0.41	0.35	0.48	0.53	–8.32%
Publishing	0.72	0.27	0.60	0.24	1.03	0.75	0.30	0.80	0.53	0.61	2.13%
Chemicals	0.98	0.53	0.30	0.27	1.35	0.67	0.90	0.54	0.83	0.70	10.62%
Petroleum	0.82	0.09	0.28	0.16	2.74	0.75	0.56	0.31	0.55	0.55	5.24%
Electronics	1.24	0.86	0.46	0.38	1.17	0.99	0.62	1.02	1.49	1.15	14.80%
Transportation	0.97	0.27	0.27	0.22	1.03	0.54	0.70	0.47	1.00	0.68	0.12%
Communication	1.09	0.64	1.15	1.11	1.02	1.30	1.47	1.68	1.55	1.35	9.63%
Utilities	0.91	0.06	0.48	0.13	0.64	0.34	–	0.18	0.20	0.23	3.83%
Restaurants	0.58	0.10	0.32	0.33	–	0.50	0.30	0.40	0.46	0.45	–2.43%
Food-stores	–	0.20	0.29	–	0.55	0.56	–	0.61	0.53	0.55	4.33%
Hotels	0.46	1.01	0.27	0.24	0.75	0.50	–	0.61	0.82	0.58	–3.04%
Personal services	0.82	–	–	–	–	0.54	–	0.35	0.67	0.58	3.49%
Business services	1.43	1.04	0.90	0.50	2.09	1.09	0.71	1.35	1.49	1.30	18.14%
Healthcare	0.73	0.29	0.31	0.20	–	1.38	–	0.44	0.67	0.62	12.23%
Business advisory	1.13	0.53	0.90	0.46	0.99	0.69	0.21	0.61	0.80	0.69	6.18%

Notes: The average returns are computed as arithmetic average total returns in US dollars for the period January 1997 through December 2000.

Utilities and Food and Tobacco, which are involved in producing the more basic needs of life, and which exhibit relatively low sensitivities to movements in the overall market. When comparing national beta averages we occasionally document strong deviations from the overall average, which can partly be explained by the small size of some of the subsamples, and the occasional dominance of certain industries.¹¹ Overall, the beta results from Table 3 corroborate with standard literature in which similar cross-industrial variations have been well documented.

The last column of Table 3 provides the arithmetic¹² average annual total returns of each industry. Again these statistics reveal a strong variation across industries, which is in line with the corresponding variation in beta.

4.2. Real estate ownership and stock performance

Having quantified both corporate real estate ownership and stock performance, we turn to the relationship between both variables. As a first step in the study of the interrelation between corporate real estate holdings and firm performance we start with a plain comparative correlation analysis.

The first column of Table 4 lists the average correlation coefficients between a firm's CRER and the average annual total stock return (ATR). These coefficients indicate a significantly negative relationship between both variables, which corroborates with the common notion that the real estate risk-return profile is modest compared to the corporate activities undertaken by most firms in the sample. For high yielding industries like Communications and Business Services the real estate ownership—stock return relationship appears to be significantly negative, while this relationship turns out positive for low yielding industries like Agriculture and Restaurants. Obviously this crude method covers only one side of the performance medal, since risk is lacking in these comparisons. To repeat the exercise with a risk-adjusted return measure we also derived correlation coefficients on the relationship between CRER and Jensen's alpha. The correlation coefficients correspond largely with the coefficients on the non-risk adjusted returns and again, a generally negative relationship is found.

Regarding risk we computed two series of correlation coefficients. The first column of this risk section of Table 4 lists the average correlation coefficients between the individual CRERs and the corresponding equity betas. In general, the results exhibit a significantly negative relationship. Apparently companies with large real estate holdings tend to be associated with the lowest betas, or perhaps vice versa, firms with the lowest betas have the highest real estate ownership levels. Low beta firms face relatively low cost of capital and are therefore expected to have less trouble in financing their corporate real estate holdings using their access to 'cheap debt.' If this line of thought is accepted we would expect to find a positive relationship between corporate real estate ratios and debt ratios. The results in the fourth column of Table 4 support this notion and list positive correlation coefficients between both ratios. In order to isolate the influence of the corporate real estate factor in a more precise manner, we continue the analysis using multivariate regressions in which we can control for the variation in leverage.

Table 4. Correlation coefficients between CRER and return and risk.

SIC	n	Return		Risk	
		Correl. CRER, ATR ^a	Correl. CRER, α	Correl. CRER, β_e	Correl. CRER, DR
Agriculture	29	0.19	0.19	0.07	0.05
Mining	318	0.07	0.05	-0.15	0.21*
Food and Tobacco	350	-0.07	-0.06	-0.013	0.10
Textile	124	-0.17	-0.13	0.32*	0.13
Publishing	132	-0.21*	-0.14	-0.19*	-0.13
Chemicals	628	-0.35*	-0.31*	-0.27*	0.35*
Petroleum	48	-0.13	0.04	-0.16	0.24
Electronics	676	-0.24*	-0.20*	-0.11*	0.24*
Transportation	118	-0.04	-0.06	-0.01	0.37*
Communication	259	-0.28*	-0.30*	0.02	0.40*
Utility	238	-0.14*	-0.12	-0.31*	0.24*
Restaurants	127	0.12	0.01	-0.06	0.24*
Food-stores	119	-0.04	-0.10	-0.07	0.20*
Hotels	61	-0.39*	-0.40*	-0.19	0.19
Personal Services	21	0.04	0.12	-0.51*	0.31
Business Services	1,109	-0.21*	-0.17*	-0.24*	0.38*
Health Care	75	-0.19	-0.16	-0.31*	0.17
Business Advisory	205	-0.25*	-0.20*	-0.04*	0.36*
Overall	4,636	-0.17*	-0.17*	-0.26*	0.38*

^aThese correlation coefficients quantify the relationships between the corporate real estate ratio (CRER) and the Average Total Return (ATR), Jensen's alpha (α), the Beta (β) and the Debt Ratio (DR). Correlation coefficients market with * are statistically significant at a 5% level.

4.3. Regression analysis

In order to deal with the multicollinearity regarding leverage and real estate ownership and to incorporate the simultaneity of the relationship that may be underlying this matter we regress both beta and alpha on the 'predicted' CRER resulting from the first stage regression, and on company size, leverage and a set of dummies correcting for differences between industries and national samples. Table 5 summarizes the main results originating from these regressions.

Panel A of Table 5 focuses on the cross-sectional variation in firm risk and gives support to the earlier results of the preceding correlation analysis. The coefficient regarding the corporate real estate ratio is negative and is statistically significant. Locking corporate financial resources in relatively safe real estate assets apparently reduces a firm's systematic risk exposure. In order to test the robustness of this outcome we also ran the same set of regressions for separate industries. This analysis is limited to the seven industries for which we have enough observations, not only across the sample as a whole, but also within each individual country. The results are provided in the lower

Table 5. Two stage least squares regression output.

Factors				Country dummy													
Co	CRER	Size	DR	i = 1	i = 2	i = 3	i = 4	i = 5	i = 6	i = 7	i = 8						
A. Beta																	
Overall	0.36*	-0.26	0.03*	-0.02	0.23*	-0.28*	-0.34*	-0.36*	0.25*	0.01	-0.21*	0.13*					
Industry dummy																	
j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7	j = 8	j = 9	j = 10	j = 11	j = 12	j = 13	j = 14	j = 15	j = 16	j = 17	R ² adj.
-0.02	0.19	0.04	0.16*	0.09	0.19*	0.06	0.61*	0.26	0.82*	-0.24	0.12	0.04	0.07	0.75*	0.12	0.17	0.32
Food and tobacco	0.43*	-0.16	-0.03*	0.18	0.41*	-0.09	-0.09	-0.07	-0.11	0.35*	0.31*	0.35*	0.31*	0.30*	0.31*	0.17	0.31*
Publishing	0.45*	-0.79*	0.06*	0.80	-0.06	-0.53*	-0.53*	-0.28	-0.41	0.59	0.17	0.59	0.17	-0.51*	-0.30*	0.21	-0.30*
Chemicals	0.70*	-1.14*	0.01	0.60*	0.53*	0.02	-0.35*	-0.31*	-0.35*	0.97*	0.18*	0.97*	0.18*	0.48*	0.19*	0.15	0.19*
Electronics	0.46*	0.21	0.10*	-0.32*	0.44*	-0.13	-0.50*	-0.50*	-0.49*	0.03	-0.02	-0.49*	-0.02	-0.49	0.43*	0.25	0.43*
Transportation	0.08	-0.22	0.06*	0.42	0.20	-0.10	-0.21	-0.21	-0.12	0.51*	0.15	0.51*	0.15	0.43	0.53*	0.35	0.53*
Communication	1.71*	-0.27	-0.04	1.73*	-0.87*	-1.23*	-0.50	-0.50	-0.53	-0.48	-0.32	-0.48	-0.32	-0.36	-0.24	0.16	-0.24
Business services	1.33*	-0.80*	0.04*	-0.80*	0.24	-0.45	-0.51*	-0.51*	-0.71*	0.64	-0.08	0.64	-0.08	-0.63	0.10	0.11	0.10

B. Alpha																		
Overall	0.76*	-0.33	0.00*	-0.02	0.26	0.01*	-0.07	-0.40	0.54	0.12	-0.17	0.01*	R ² adj.					
Industry dummy																		
j = 1	j = 2	j = 3	j = 4	j = 5	j = 6	j = 7	j = 8	j = 9	j = 10	j = 11	j = 12	j = 13						j = 14
	0.00	0.00	0.00	0.00	0.00	0.01*	0.00	0.01*	0.00	0.00	0.00	0.00	0.00	0.01*	0.01	0.01	0.10	
Food and tobacco	-0.58	-0.23	0.08	-0.59	0.49	0.81	0.10	0.48	-0.16	0.21	1.25	1.06*	0.06					
Publishing	-0.85	-0.98	0.18*	-0.36	-0.41	0.34	0.16	-0.06	3.03*	0.55	-0.71	0.29	0.11					
Chemicals	-0.69	-0.41	0.14*	-2.62*	3.19*	1.25	1.14	0.06	2.34*	0.71	1.00	2.01*	0.12					
Electronics	0.37	-1.26	0.14*	3.40*	-0.39	2.54*	-0.29	-0.47	0.80	0.28	0.52	1.23*	0.14					
Transportation	-0.34	0.74	0.11	-3.49*	1.05	0.96	1.15	0.45	-0.21	-0.02	0.78	0.40	0.11					
Communication	2.60*	-5.03*	0.01	-1.43	1.32	0.63	-0.84	1.88	0.06	1.02	-0.19	0.00	0.06					
Business services	-0.24	-2.24*	0.36*	-1.32	0.82	0.92	-0.75	-1.12	1.65	0.74*	-1.95	0.09	0.13					

Notes: The country dummies control for national variations, where $i = 1$ is Australia, 2 is Canada, 3 is France, 4 is Germany, 5 is Hong Kong, 6 is Japan, 7 is The Netherlands, 8 is the United States. The industry dummies control for cross-industrial variations, where $j = 1$ is Agriculture, 2 is Mining, 3 is Food, 4 is Textile, 5 is Publishing, 6 is Chemicals, 7 is Petroleum, 8 is Electronics, 9 is Transportation, 10 is Communication, 11 is Utilities, 12 is Restaurants, 13 is Foodstores, 14 is Hotels, 15 is Personal Services, 16 is Business Services, and 17 is Health Services. Coefficients marked with * are statistically significant at a 5% level.

half of Panel A. Apart from the Electronics industry all subsamples exhibit the same negative relationship between CRER and beta.

Regarding the effects of real asset investments on stock outperformance we perform a similar analysis, in which we first regress Jensen's alpha on the predicted CRER and the controlling variables for all companies, and then repeat the analysis on a sector-by-sector basis. The results are reported in Panel B of Table 5. For the overall regression, we find a negative, but insignificant relationship between relative real estate holdings and risk-adjusted stock performance. However, the sector-by-sector analysis shows that the effect of corporate real estate ownership on outperformance is to a large extent driven by the sector the company operates in. Although we generally find a negative effect, the regression coefficient differs quite substantially. For the Communication sector, it is -5.03 and significant, and for Business Services it is a significant -2.24 . On the other hand, we find a positive but not statistically coefficient for Transportation. Note, however, that the sample of companies in the Transportation sector is much smaller than for Communication and Business Services. These results indicate that corporate real estate performance effects are partly sector-driven, which makes a lot of sense given the variance in the strategic importance of real estate for companies in different industries. For Communication and Business Services, real estate is a non-strategic tool, while having an expedition center at the exactly right location can derive substantial cost savings for a Transport company.

5. Conclusions

Institutional real estate investment and corporate real estate ownership are two sides of the same coin. In the long run, growth of the institutional real estate market will have to come from diminishing real estate ownership by companies. However, if real estate ownership is beneficial to the performance of corporations, diminishing ownership will not be very likely. To shed more light on this, we have studied the effects of corporate real estate holdings on firm performance. We examined corporate real estate holdings and the performance of non-real estate companies in 9 industrialized economies. Using detailed balance sheet information we quantified the real estate ownership levels of 4,636 companies in these countries. Real estate ownership appears to vary primarily across industries, with Business Services and Business Advisory on the low end and heavy industries on the high end of the range. A second notable pattern in the corporate real estate holdings was the change over time. For most of the 18 industries we have analyzed, we documented a steady decrease in real estate ownership. Overall, the corporate real estate ratio decreased significantly from 0.34 in 1992 to 0.29 in 2000.

After quantifying each firm's risk and return characteristics in a single-index model by computing betas and Jensen's alphas, we linked these measures to corporate real estate holdings in order to study their interrelationships. By applying both correlation and multivariate regression analysis we measured the effects of corporate real estate ownership on firm risk and return. While controlling for variations in leverage, size, industry and

country of origin we documented a negative influence of real estate holdings on systematic risk, which holds for a wide range of industries. We also find a generally negative relationship between real estate ownership and risk-adjusted stock performance, but this negative impact is only significant in the Communications and Business Services sectors. For the Transportation sector, we find a positive relationship between real estate ownership and corporate performance. These results may be explained by the different strategic importance of real estate for various industries.

To conclude, our results show that corporate real estate holdings generally decrease the risk and the return of a firm, but that the latter is not necessarily the case for all firms. The sector in which a firm is active can make a crucial difference regarding this issue. This implies that further research of the implications of corporate real estate ownership will have to take industry sector into account in order to make meaningful inferences regarding performance effects and corporate real estate strategy.

Appendix: Description of Standard Industrial Classification (SIC)

SIC 0100–0299	Agriculture Agricultural production—crops Livestock and animal specialties
SIC 1000–1499	Mining Metal mining Coal mining Oil and gas extraction Mining and quarrying of nonmetallic mineral, except fuels
SIC 2000–2199	Food and Tobacco Food and kindred products Tobacco products
SIC 2200–2299	Textile mill products
SIC 2700–2799	Publishing, printing and allied industries
SIC 2800–2899	Chemicals and allied products
SIC 2900–2999	Petroleum refining and related industries
SIC 3600–3699	Electronic and other electrical equipment and component, except computer equipment
SIC 4400–4599	Transportation Water transportation Transportation by air
SIC 4800–4899	Communications
SIC 4900–4999	Electric, gas, and sanitary services
SIC 5800–5899	Eating and drinking places
SIC 5400–5499	Food stores
SIC 7000–7099	Hotels, rooming houses, camps, and other lodging places
SIC 7200–7299	Personal Services (laundry services, beauty shops, funeral services, etc.)
SIC 7300–7399	Business Services (advertising, employment agencies, computer rental, etc.)
SIC 8000–8099	Health services
SIC 8700–9799	Business Advisory (Engineering, accounting, research, management, and related services)

Acknowledgments

The authors like to thank Bob Edelstein, Norman Miller, Dogan Tirtiroglu, participants to the Commercial Real Estate Session of the 2003 AREUEA Annual Conference in Washington DC, and the participants of the 2003 Cambridge–Maastricht Symposium for their helpful comments. The SBV School of Real Estate and the Dutch Association of Real Estate Researchers (VOGON) are thanked for their financial support.

Notes

1. IPD provides market values for the national IPD indices for Germany, France and the United Kingdom, and also give estimates for the market coverage of these indices. In December 2002, the German index had a market value of 35 billion, with a coverage of 30%; the French index had a 52.5 billion market value, with a coverage of 57%; and the British index had a market value of 145 billion, with a coverage of 67%.
2. See Rodriguez and Sirmans (1996) for a thorough discussion of the most relevant literature.
3. The sample is based on Compustat's Global Vantage universe for the 9 chosen countries. The only difference is that we exclude banks and insurance companies, due to the fact that their asset bases are difficult to compare with those of other firms. This is in line with previous research (see Deng and Gyourko, 1999; Seiler et al., 2001). In order to avoid potential survivorship bias we have repeated the selection procedure for each of the four sample years.
4. More detailed information regarding the industrial SIC-classification is presented in the Appendix.
5. We are aware of the distorting effect of equipment in this variable. PPE, however, offers the best available proxy for real estate ownership and the consistent construction method of Compustat guarantees a fair international comparison. Previous studies on corporate real estate ownership like: Deng and Gyourko (1999), Seiler et al. (2001) and Ciochetti and Shilling (2002) have used PPE as well.
6. Both values are book values, such that potential endogeneity problems biasing the estimates are reduced to the minimum.
7. The resulting F-statistics needs to be compared to the matching $df(3,15998)$ $F_{0.05}$ critical point of 2.60.
8. In this situation in which the explanatory variable CRER is endogenous applying OLS would yield estimates of the coefficients that suffer from the simultaneity bias, causing inconsistency in the estimates.
9. We are aware of the correlation between leverage and corporate real estate ownership and its influence on the equity beta and we control for multicollinearity complications by adding the variables separately. Deng and Gyourko (1999) used the asset beta as a proxy for systematic risk, which forced them to make an assumption regarding the value of the systematic risk of debt. They assumed the same debt beta for all sectors. While that assumption may be realistic for a study focusing on one country, that is less likely to be the case for an international study like ours, which is why we have chosen to use the equity beta as the yardstick for systematic risk. However, to test the validity of that approach, we have also done the regression analysis with an asset beta setting similar to Deng and Gyourko and find no significant difference in the coefficient for corporate real estate ownership (-0.27 for equity beta approach and -0.26 for asset beta approach). The only difference relates to the leverage variable, which turns significantly negative for the asset beta, while it is insignificant for the equity beta.
10. It has been documented that in times of financial slumps firms are more likely to sell their real estate holdings in order to increase their financial strength. To include this phenomenon into the set of regressions we constructed a dichotomous dummy variable that divides the sample into firms with average annual stock returns below and above -10% .
11. The Agriculture industry sample consists of only 29 companies, therefore national subsamples tend to become small and averages become less reliable due to the lack of numbers.
12. We compute arithmetic mean returns in order to illustrate the great variance in average performance over time.

References

- Ambrose, W. B. (1990). "Corporate Real Estate's Impact on the Takeover Market," *Journal of Real Estate Finance and Economics* 3(4), 307–322.
- Arthur Anderson & Company. (1993). *Real Estate in the Corporation: The Bottom Line from Senior Management*. San Francisco, USA.
- Ciochetti, B. A., and J. D. Shilling. (2002). "The Disappearance of the Small Stock Premium and the Emergence of an Equity Premium on Large Firms," Working Paper.
- Deng, Y., and J. Gyourko. (1999). "Real Estate Ownership by Non-Real Estate Firms: An Estimate of the Impact on Firm Returns," Unpublished Working Paper, Wharton School.
- DTZ. (2003). *Money Into Property—Europe*, The Netherlands: Amsterdam
- Glascok, J., W. Davidson, and C. F. Sirmans. (1989). "An Analysis of the Disposition and Acquisition of Real Estate Assets," *Journal of Real Estate Research* 4(3), 131–140.
- Glascok, J., W. Davidson, and C. F. Sirmans. (1991). "The Gains from Corporate Selloffs: The Case of Real Estate Assets," *AREUEA Journal* 19(4), 567–582.
- IPD. (2003a). IPD Germany Index 2002.
- IPD. (2003b). IPD France Index 2002.
- IPD. (2003c). IPD United Kingdom Index 2002.
- Krumm, P. J. M. M., and P. Linneman. (2001). "Corporate Real Estate Management," Wharton Working Paper #370.
- Manning, C. (1991). "Leasing versus Purchase of Corporate Real Property: Leases with Residual Equity Interests," *Journal of Real Estate Research* 6(1), 79–85.
- Myer, F. C., L. He, and J. R. Webb. (1992). "Sell-Offs of U.S. Real Estate: The Effect of Domestic versus Foreign Buyers of Shareholder Wealth," *AREUEA Journal* 20(3), 487–500.
- Rodriguez, M., and C. F. Sirmans. (1996). "Managing Corporate Real Estate: Evidence from Capital Markets," *Journal of Real Estate Literature* 4(1), 13–36.
- Rutherford, R. C. (1990). "Empirical Evidence on Shareholder Value and the Sale-Leaseback of Corporate Real Estate," *AREUEA Journal* 18(4), 522–529.
- Seiler, S. J., A. Chantrath, and J. R. Webb. (2001). "Real Estate Ownership and the Risk and Return to Stockholders," *Journal of Real Estate Research* 22(1), 199–212.
- Slovin, M. B., M. E. Sushka, and J. A. Polonchek. (1990). "Corporate Sales-and-Leaseback and Shareholder Wealth," *Journal of Finance* 45(1), 289–299.
- Veale, P. (1989). "Managing Corporate Real Estate: Current Executive Attitudes and Prospects for an Emergent Management Discipline," *Journal of Real Estate Research* 4(3), 1–22.
- Zeckhauser, S., and R. Silverman. (1983). "Rediscover Your Company's Real Estate," *Harvard Business Review* 61(1), 111–117.